Resin Synthesis from Used Paper

Corrugated fiberboard (double-sided, A-flute) was cut into 5-mm squares. 100 g of the corrugated fiberboard squares were put into 3 l of an enzyme solution, and the solution was agitated at 45°C for 6 hours to undergo enzymatic decomposition. In this enzymatic decomposition, 10 g of cellulase (Meicelase TP60, by Meiji Seika Kaisha, Ltd.) dissolved in 3 l of acetic acid/sodium acetate aqueous solution (pH 4.5) was used as the enzyme solution. After the completion of the reaction, 200 ml of methanol was added to the solution, the insoluble residue was filtered out, the filtrate was passed through an ion-exchange resin column (Amberite IR-120B, by Japan Organo Co., Ltd.) 50 cm long, and the solvent was distilled out of the filtrate, which underwent drying. As a result, 64 g of slightly yellowish powder, which was a saccharic mixture having glucose, cellobiose, cellotriose as main components, was obtained.

50 g of the saccharic mixture was copolymerized with sebacic acid chloride in the same manner as Example 1 and the copolymer was allowed to contain silicone oil; thus, 55 g of slightly brown solid, which was the resin composite of this example, was obtained.

Examples 9 and 10

Method using Kneading/Post Crosslinking

5 g of glucose, 2 g of adipic acid and 6 ml of

acetic anhydride were mixed together, and the mixture was agitated at 120°C for 1 hour. Then 0.5 g of zinc chloride was mixed into the mixture, followed by agitation at a reduced pressure of 6.7 kPa. After 1 hour, 2 g of additional adipic acid was mixed into the mixture, again followed by agitation at a reduced pressure of 6.7 kPa. The obtained paste was put into water and washed while being crushed, as a result of which 8 g of brown powder was obtained. Then 2 g of polyethylene glycol (number average molecular weight of 600) and 2 g of amino-modified silicone oil (TSF4703, by Toshiba Silicone Co., Ltd.) are added to 2 g of the above powder separately taken, respectively. Each mixture was kneaded at 120°C, and heated while being left stand for 1 hour. As a result, a rubber-like solid was obtained from each mixture.

Examples 11 to 20

Molding

Rice cake-like solids (1 g each) obtained in Examples 1 to 8 were compression molded at 180°C, 2 MPa using a cylindrical die (cylindrical shape, inside dimension, 2 cm in diameter, 3 mm in depth). As a result, a dense molded form having both elasticity and flexibility was obtained in each case.

Example 21

Shock Absorbing Medium

120 g of rice cake-like solid was synthesized in

the same manner as obtaining the resin composite of Example 1. The obtained rice cake-like solid was stretched out on a hot plate at 180°C to put it in a string form and then cut into about 5-mm lengths, to prepare a shock absorbing medium in the pellet form.

Example 22

Roller

50 g of rice cake-like solid obtained in Example 7 was compression formed (180°C, 3 MPa, using no die) to put it in a sheet form 20 cm long × 20 cm long × 1 mm thick, wound around and pressed on an aluminum pipe (2 cm in diameter) while being kept on the heated hot plate, and then quenched, to prepare a recording medium conveying roller for an ink jet printer.

As described so far, this invention provides a resin composite of which production contributes to making good use of waste vegetable resources, such as used paper and waste molasses, as raw materials, and moreover, which itself can be a useful material because it has properties of elasticity and flexibility just as rubber and is expected to have wide applications. Further, this invention provides: a method of producing the above resin composite; a molded form consisting of the above resin composite; and a shock absorbing medium and a roller obtained by processing the above molded form.